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(51) INT CL[5]
E01F 13/00 9/04

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E1G GLN

(56) Documents cited
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US 3849936 A
APT Hydrakerb - leaflet published by ADP Controls Ltd., 77-81 Scrubbs Lane, London NW10 6SH

(58) Field of search
UK CL (Edition L) E1G
INT CL[5] E01F

(54) Height-adjustable bumps for road traffic control

(57) Speed restricting bumps for placing across a road comprise a contact plate 6 which can selectively stay in position or be forced into the main body 10. Depending upon the parameters used for selection, the road wheels of a passing vehicle either hit a protruding contact plate 6 transmitting a physical shock to the vehicle, or depress the contact plate 6 to the level of the road surface, and therefore pass relatively unhindered. The selective movement of the contact plate 6 is governed by a hydraulic valve positioned either in the body 10, or at the side of the road. In another form the contact plate is normally positioned at road level and only becomes effective if the hydraulic valve permits the passing vehicle's road wheel to depress the contact plate below road level.

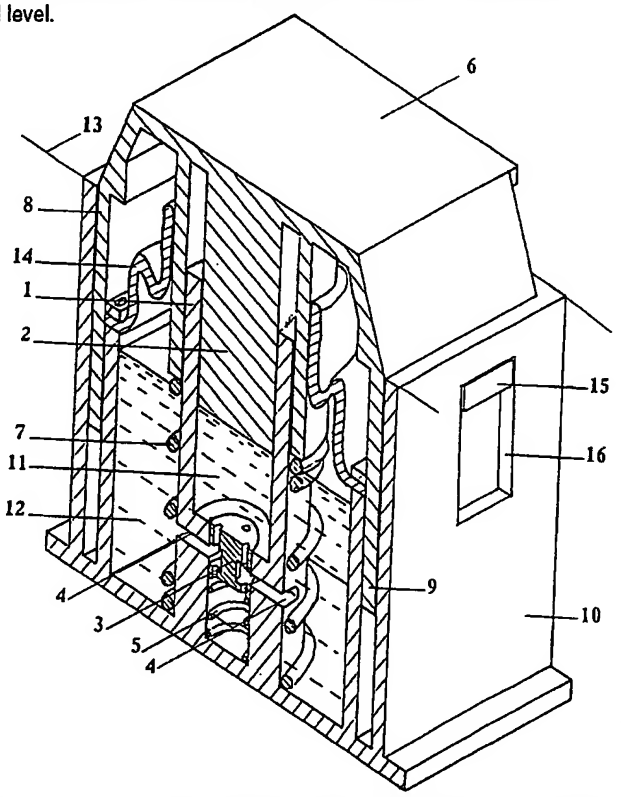

Figure 2

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

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Figure 1

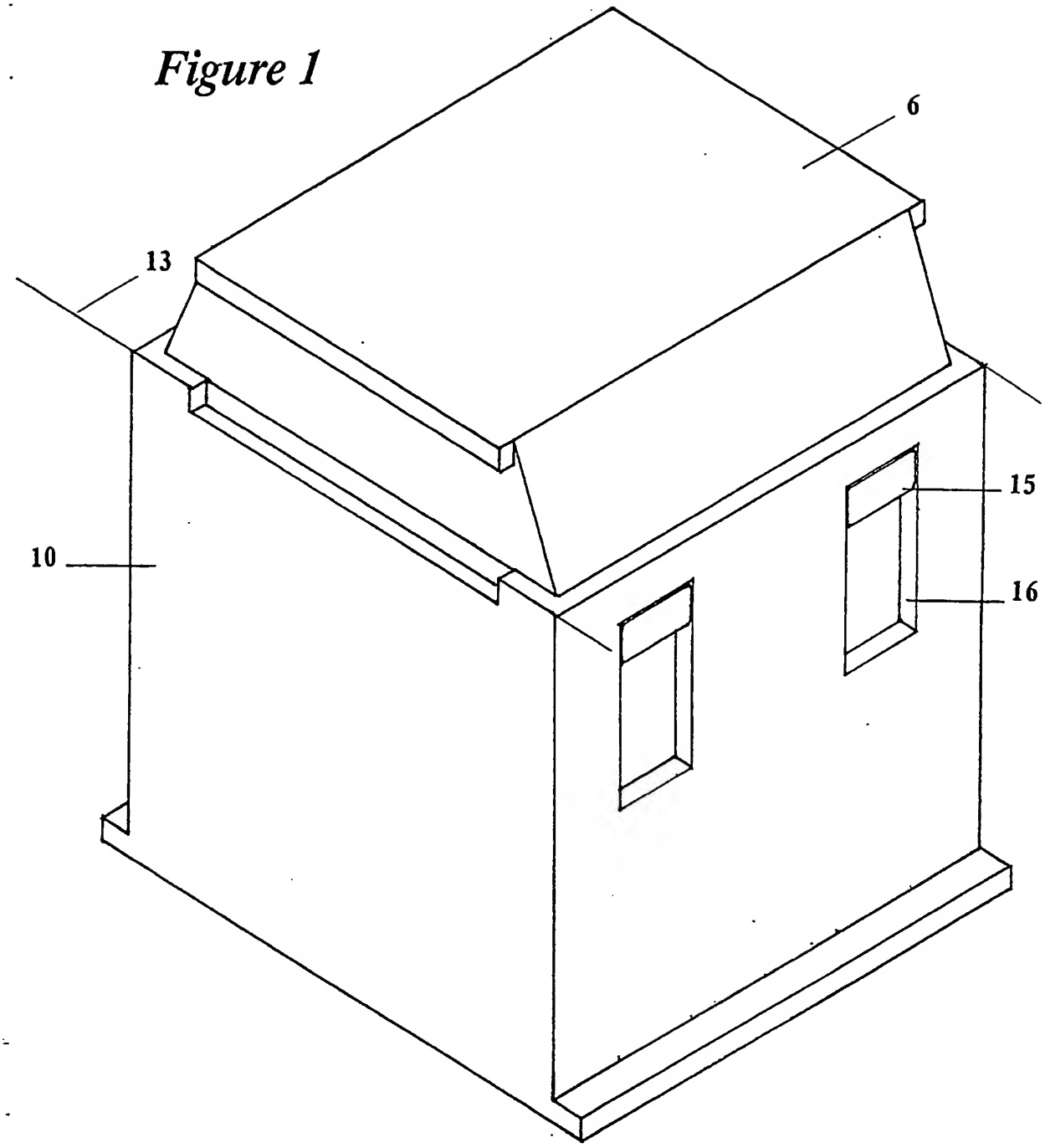


Figure 2

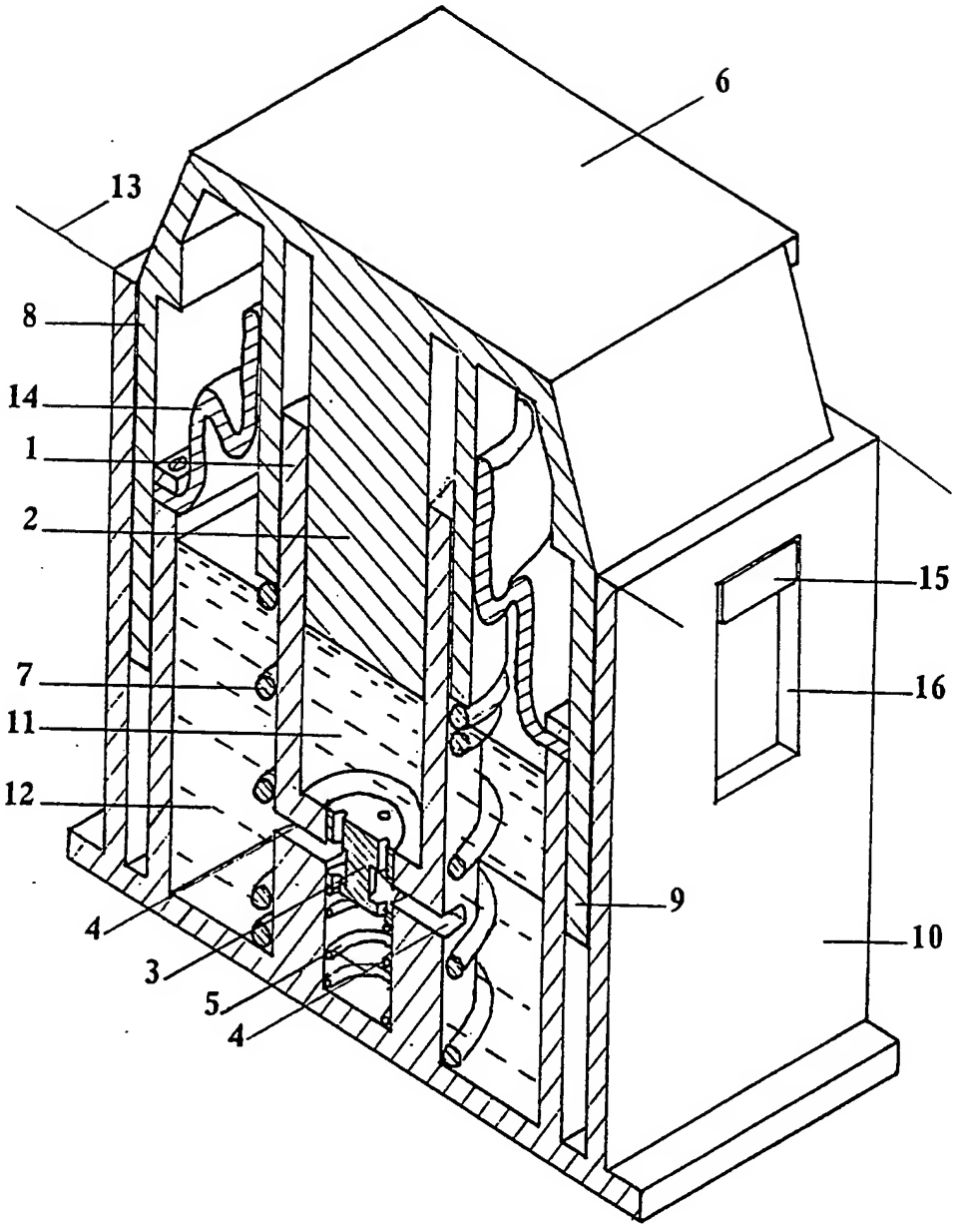


Figure 3

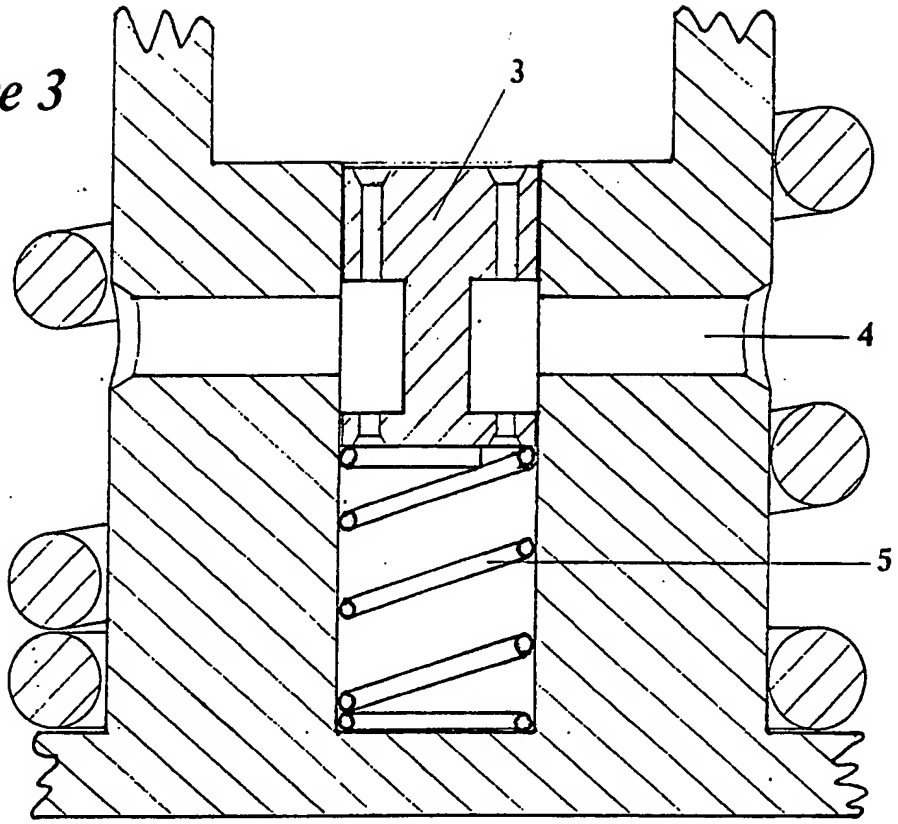


Figure 4

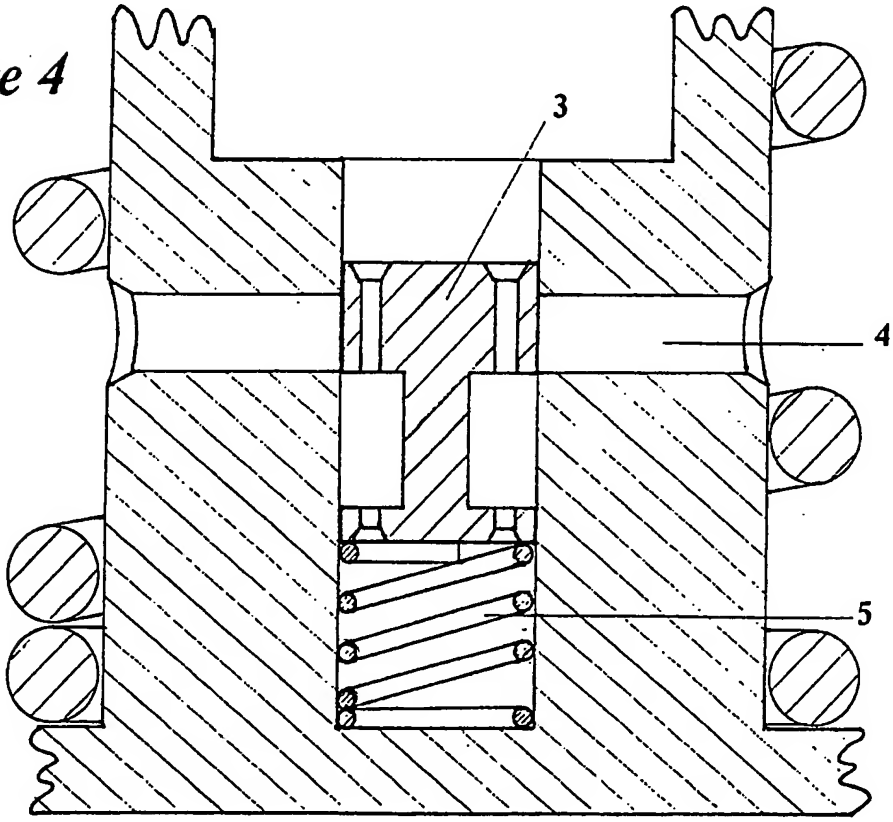


Figure 5

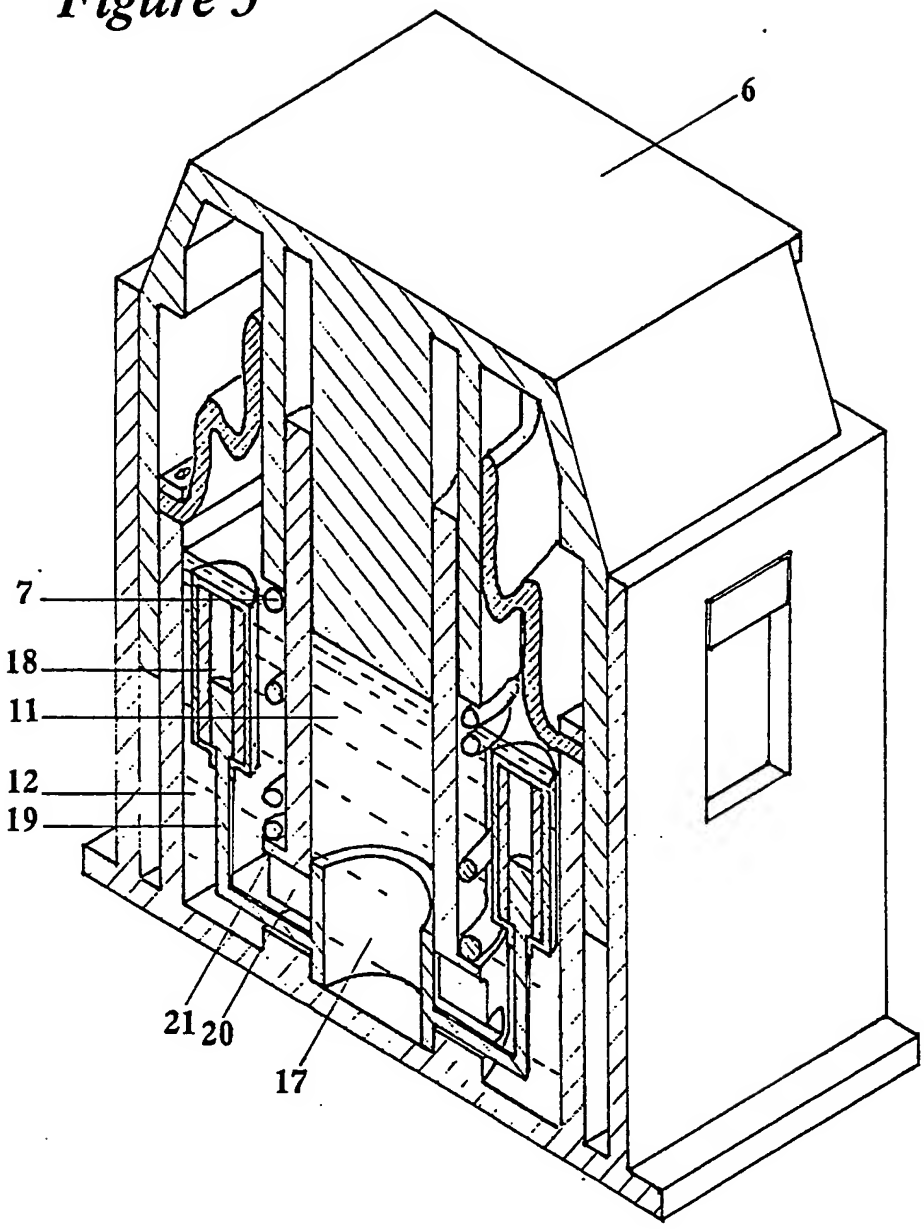


Figure 6

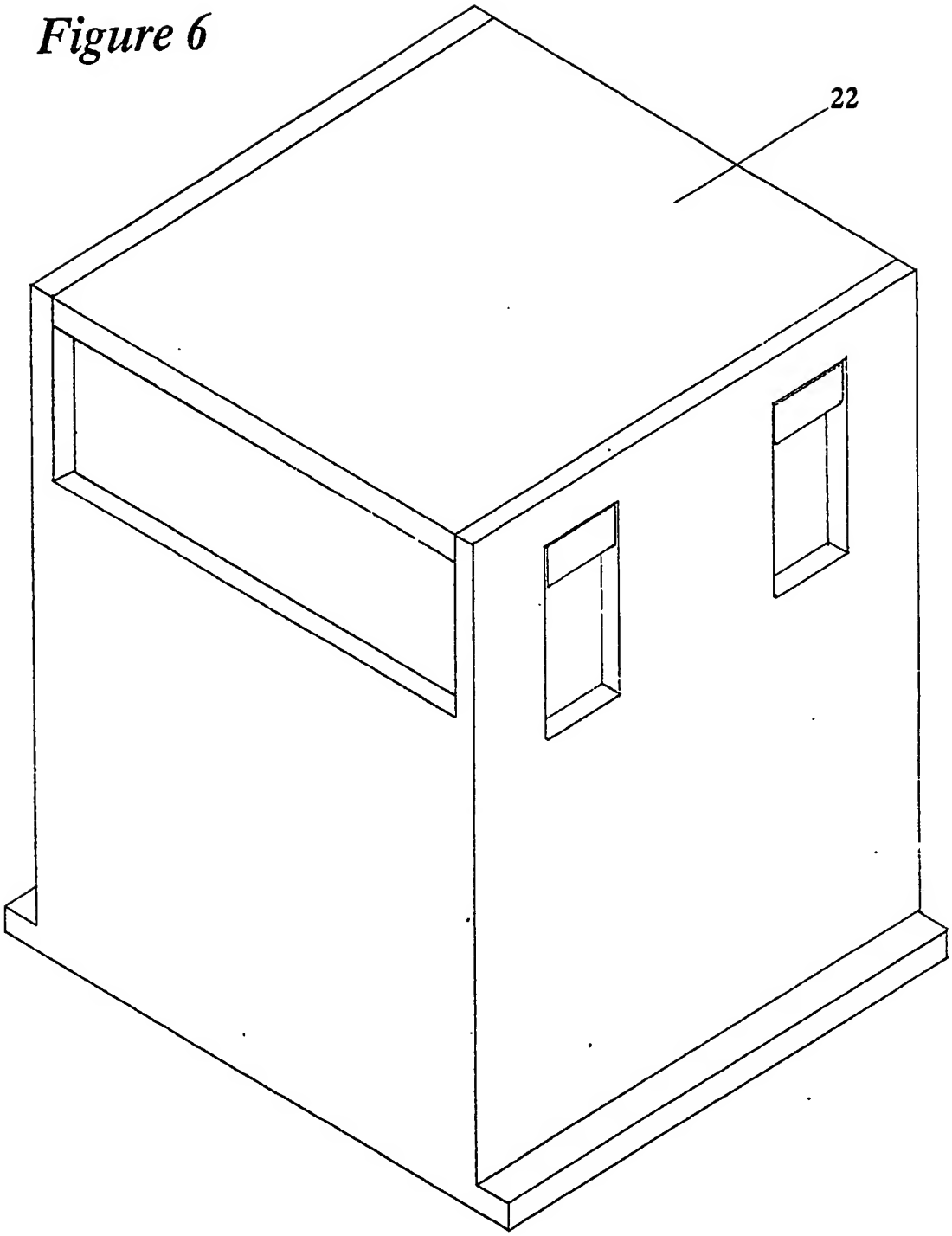


Figure 7

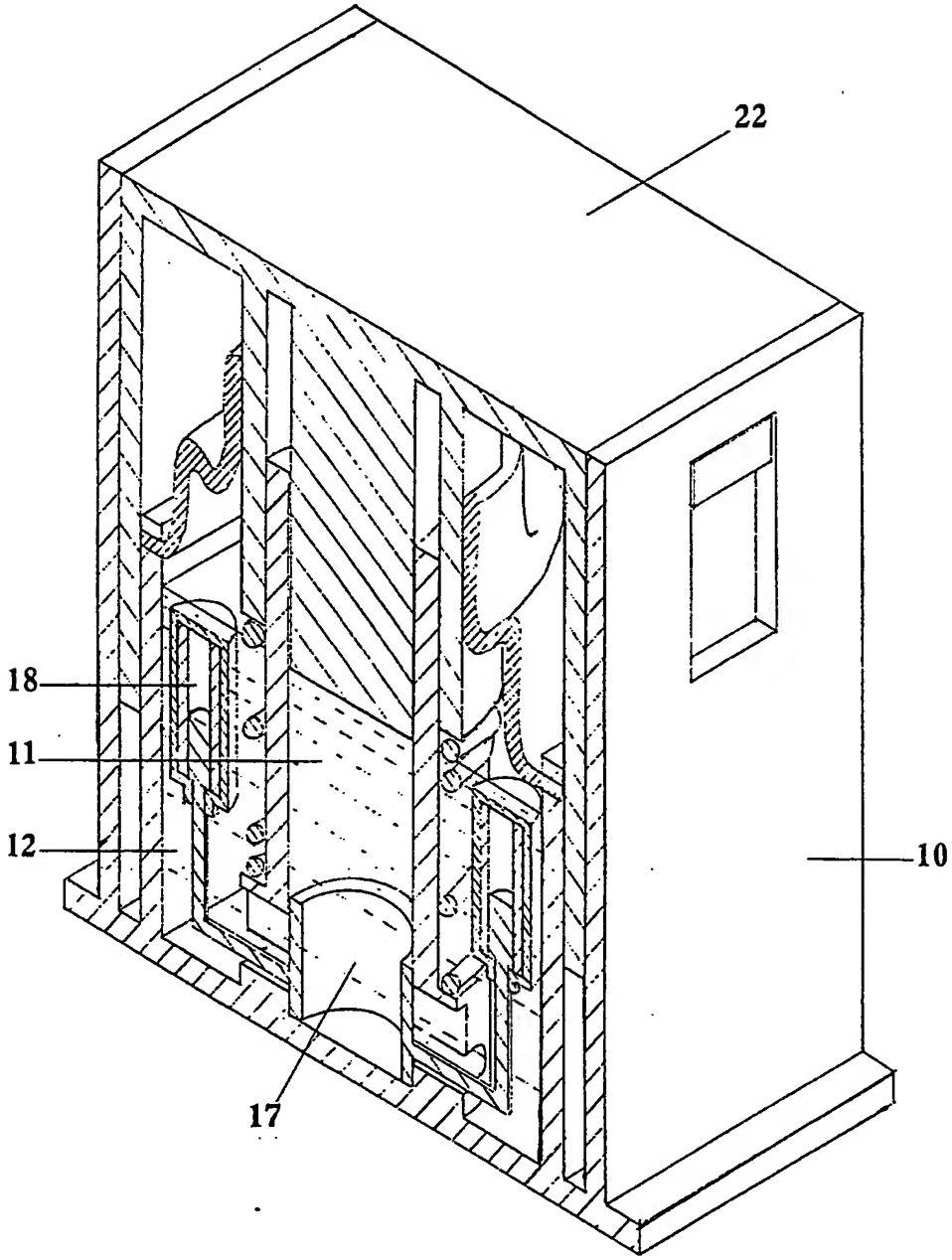


Figure 8

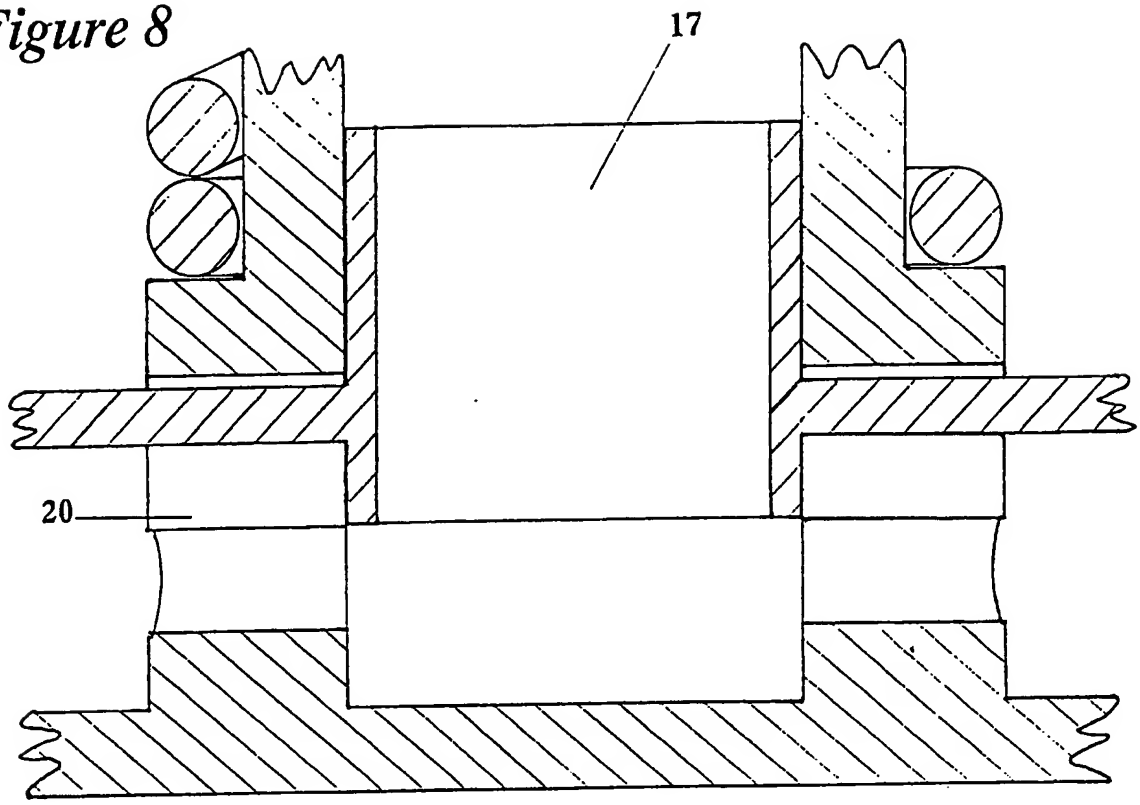
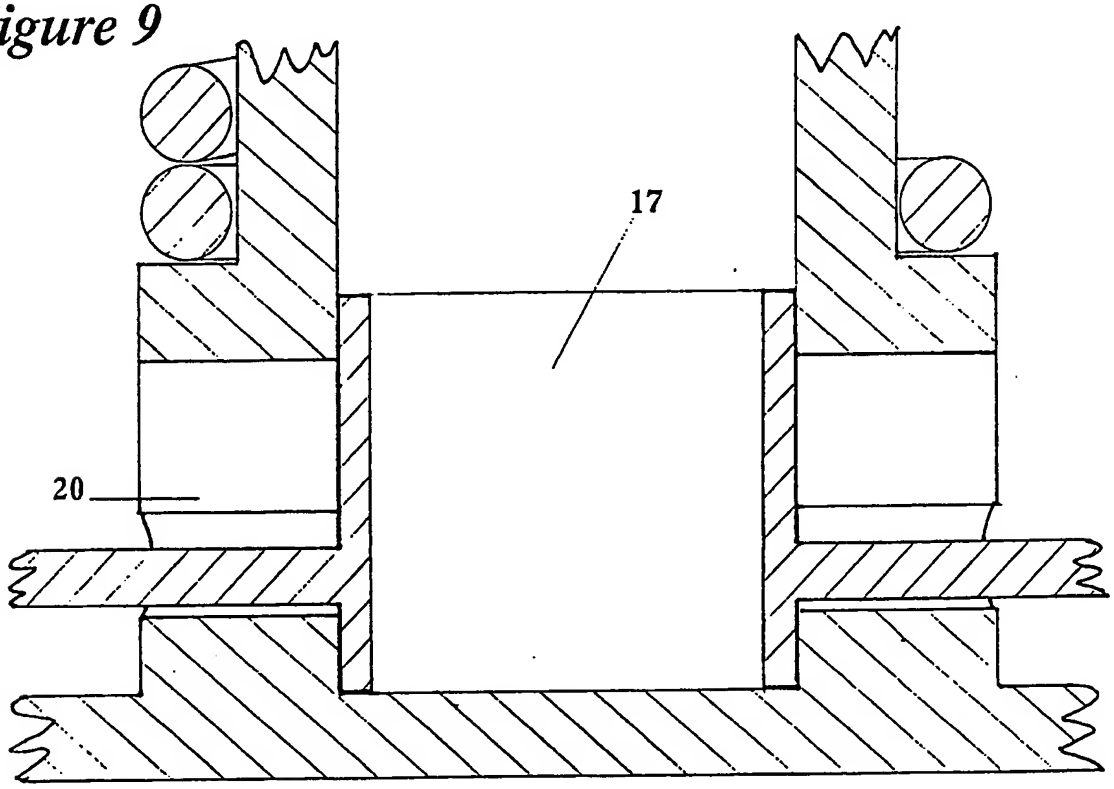


Figure 9



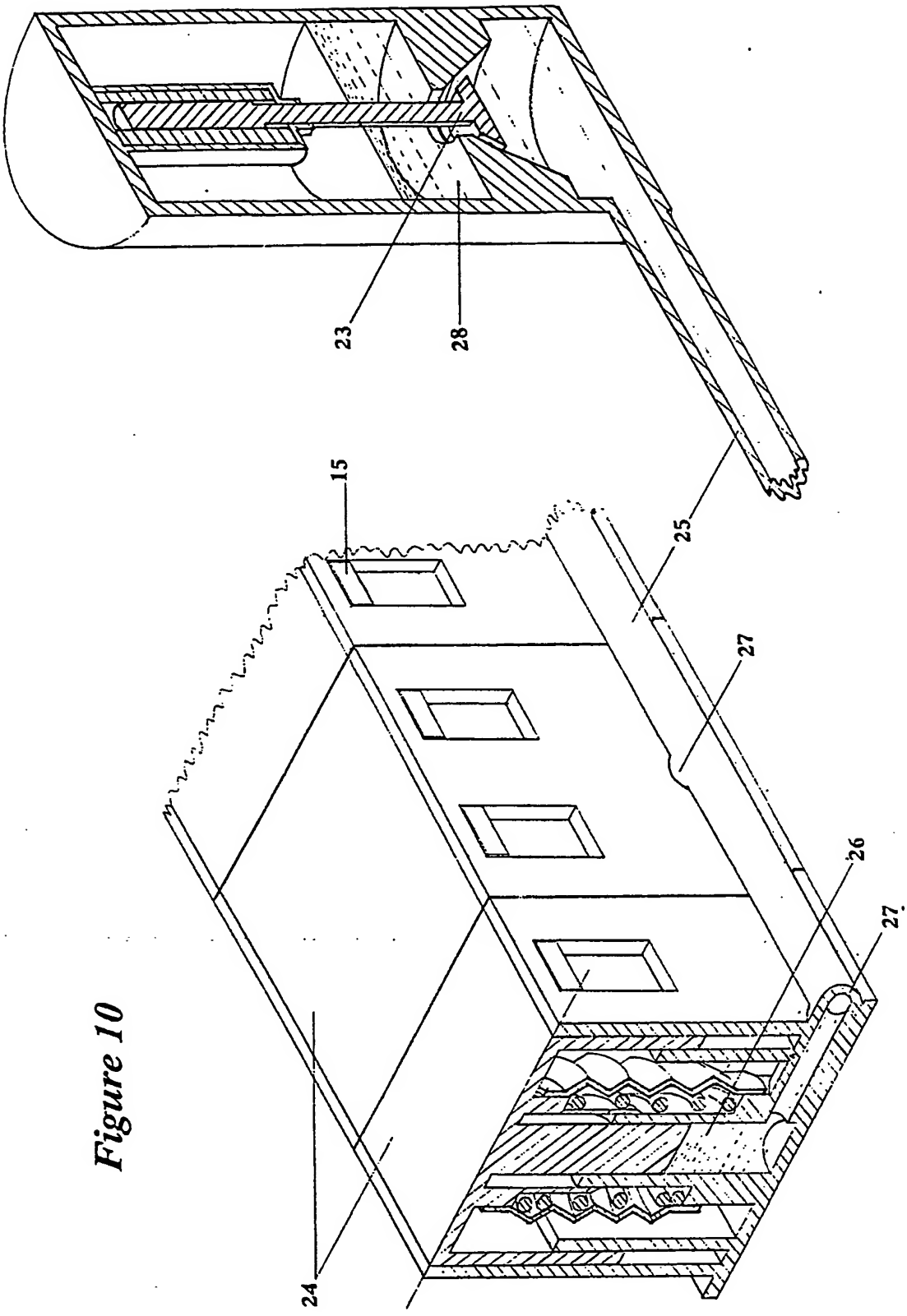


Figure 10

Figure 11

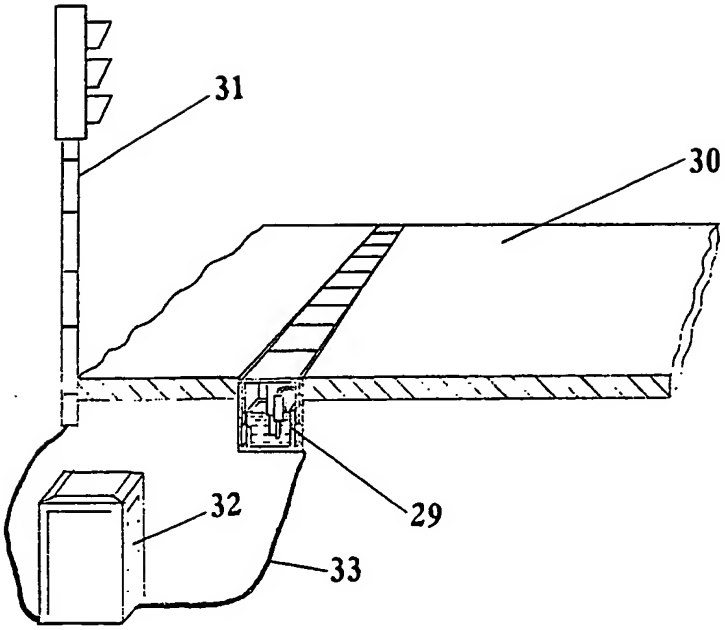
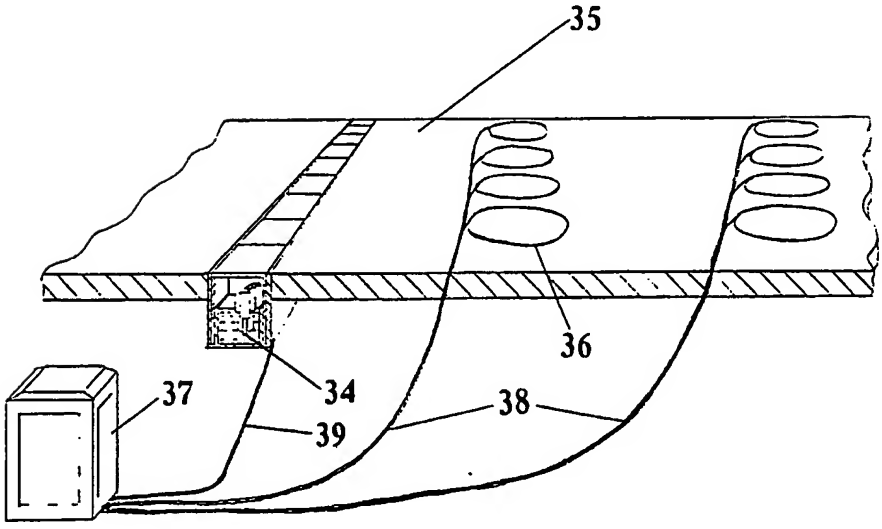


Figure 12



Improvements relating to speed obstacles on roads.

This invention relates to devices placed across roads for the purpose of restricting the speed of vehicles using the roads. Various obstacles are in common use that restrict the speed of road traffic. These obstacles, often called sleeping policemen, cause discomfort and irritation to drivers, and sometimes damage to their vehicles, especially if the vehicles are travelling at speed. Unfortunately these obstacles also penalize drivers travelling at slower speeds and they often force traffic to travel unnecessarily slowly. They therefore cause frustration to drivers and increase local pollution as drivers brake and then accelerate before and after the obstacles.

This invention aims to provide a system where minimum inconvenience is given to drivers using their vehicles within the speed limits and considerable irritation to drivers using their vehicles outside the speed limits. This would encourage a greater use of speed obstacles on roads with a subsequent diminution of traffic accidents and the saving of lives. Additionally the invention provides a means to control road traffic in a number of ways, namely;

to slow traffic during fog.

to inhibit access selectively into, for example, city centres.

to selectively limit access onto carraigeways, for example, allowing only fee paying drivers onto certain motorway lanes.

to deter the 'jumping' of traffic lights.

to ease congestion by the seqential reduction of traffic speeds on roads leading towards areas with high traffic densities.

The term 'contact plate' is used herein in relation to the part of the device that makes contact with a passing road vehicle and reacts to the said contact in the ways variously described.

Accordingly, from one aspect, this invention provides a speed obstacle comprising a hollow container incorporating a cylinder with a piston attached to a contact plate which projects above the surface of the road. The cylinder has a valve system that, either allows hydraulic fluid to pass into the main body of the container, or closes exit ports in the cylinder so keeping hydraulic fluid within the cylinder, depending on the rate of depression of the piston when depressed by a passing vehicle.

In use when a vehicle travelling below a certain speed goes over the speed obstacle the contact plate will depress to the level of the road as

hydraulic fluid is forced out of the cylinder through the open ports, causing little inconvenience to the driver of the vehicle. However if the vehicle is travelling above a certain speed it will cause the valve system to close the exit ports of the cylinder and in so doing halt the descent of the piston and contact plate by hydraulic pressure. A physical shock will be transmitted into the vehicle as the contact plate stays in the raised position. The discomfort felt by the driver from the shock will tend to set up a learned response so that next time the driver will approach the obstacles more slowly. After the vehicle has passed, both the contact plate and the valve are returned to their normal positions by the action of springs.

From a further aspect this invention incorporates electrically operated actuators connected to the valve system. This allows the speed obstacles to be remotely controlled so that the speed obstacles can be used over a range of vehicle speeds.

In use a device for measuring vehicle speeds would be placed at a position preceding the speed obstacles. Upon being activated by a vehicle this device would send an electronic signal to a control box which in turn would activate the actuators in the speed obstacle if the vehicle was travelling outside a preset speed range. Such a method of control would permit the contact plate in the speed obstacle to be normally set at road level and to become effective when dropping below road level if the valve system opened the exit ports. This aspect of the invention could be used on high speed roads, not only for normal speed regulation of traffic, but to slow traffic in exceptional circumstances, for example fog. Here the permitted traffic speeds could be altered by radio signals to the control box. Also this method could be employed to

inhibit access selectively into, for example, city centres.

deter the 'jumping' of traffic lights.

selectively limit access onto carraigeways, for example, allowing only fee paying drivers onto certain motorway lanes.

ease congestion by the seqential reduction of traffic speeds on roads leading towards areas with high traffic densities.

The invention may be performed in various ways and preferred embodiments thereof will now be described with reference to the accompanying drawings in which

Figure 1 is a perspective view of a preferred form of speed obstacle with a protruding contact plate.

Figure 2 is a cross sectional perspective view of a preferred form of speed obstacle with a self actuated valve.

Figures 3 and 4 are cross sectional details of a self actuated valve. Figure 3 shows valve open. Figure 4 shows valve closed.

Figure 5 is a cross sectional perspective view of a preferred form of speed obstacle with an externally controlled valve system and protruding contact plate.

Figure 6 is a perspective view of a preferred form of speed obstacle with a contact plate normally level with the road surface.

Figure 7 is a cross sectional perspective view of a preferred form of speed obstacle with an externally controlled valve system and a contact plate normally level with the road surface.

Figures 8 and 9 are cross sectional details of an externally controlled valve system. Figure 8 shows valve open. Figure 9 shows valve closed.

Figure 10 is a cross sectional perspective view of a preferred form of speed obstacle with an externally positioned valve system connected to more than one speed obstacle, and contact plates normally level with the road surface.

Figure 11 is a perspective view of speed obstacles used in conjuction with traffic lights.

Figure 12 is a perspective view of speed obstacles used in conjuction with a speed measuring device.

The speed obstacle shown in figures 1 and 2 comprises a cylinder 1 and a piston 2. Within the cylinder 2 is a valve system which is a piston 3 perforated with holes and held in a position above ports 4 by a spring 5. The piston 2 is fixed to the contact plate 6 held in place by a spring 7. Guides 8 and 9 form an intregral part of the contact plate 6 and extend into the body 10. Ports 4 connect the cylinder space 11 to the reservoir 12. Hydraulic fluid occupies the cylinder space 11 and also to a level above that of the height of the cylinder space 11 in the reservoir 12. The speed obstacle is installed so that the shoulder of the body 10 is level with the surface of the roadway 13. In use when the road wheels of a vehicle traverse the contact plate 6 piston 2 is forced into the cylinder 1. If the speed of the vehicle is high enough to descend the piston 2 at a sufficient rate the drag exerted by the hydraulic fluid being forced through the perforations in the piston 3 causes the piston 3 to descend against the force exerted by spring 5. This in turn causes the piston 3 to cover the ports 4 so stopping further flow of hydraulic fluid from the cylinder space 11 to the reservoir 12 as shown in figure 4. The subsequent build up of hydraulic pressure in the cylinder space 11 momentarily stops any further descent of the piston 2, locking the contact

plate 6 in a protruding position. With the contact plate 6 locked in this position the speed obstacle becomes effective and a physical shock is transmitted to the vehicle. After the vehicle has passed, the contact plate 6 and piston 2 are returned their normal position by the action of the spring 7, and the piston 3 is returned to its normal position by the spring 5, allowing hydraulic fluid to be returned from the reservoir 12 to the cylinder space 11. However if the speed of the vehicle is such that there is insufficient drag induced in the piston 3, the piston 3 stays in position so that the hydraulic fluid is ejected from the cylinder space 11 into the reservoir 12 through the perforations in the piston 3 and then the ports 4, as shown in figure 3. This permits the piston 2 and contact plate 5 to be fully depressed to the level of the road surface by the weight of the passing vehicle. The speed obstacle is therefore ineffective and the vehicle passes relatively unhindered. After the vehicle has passed the contact plate 6 and piston 2 are returned to their normal position and hydraulic fluid returned to the cylinder space 11 from the reservoir 12 by the action of the spring 5. Foreign matter is kept from contaminating the hydraulic fluid by a flexible membrane 14 that fits between the contact plate 6 and the body 10. The contact plate 6 is held in position in the body 10 by projections 15 which slide along guides 16.

Figure 5 shows another method of operation of the speed obstacle. Here the valve system is a hollow cylinder 17 connected to electrically operated actuators 18 by rods 19 through ports 20. The return spring 7 is placed on a shoulder 21. In all other essential respects the rest of the speed obstacle is the same as described in figures1 and 2. In use, the speed obstacle does not become effective until the actuators 18 are operated. Without the actuators 18 being operated the hollow cylinder 17 is held in the raised position as shown in figure 8 which allows hydraulic fluid to pass from the cylinder space 11 into the reservoir 12 through ports 20 when the piston 2 is depressed by a passing vehicle. This allows the contact plate 6 to be forced down to road level 13 and the vehicle to pass unhindered. The contact plate 6 and hydraulic fluid are returned to their normal positions by the action of the spring 7 after the vehicle has passed. If however the actuators 18 are operated the hollow cylinder 17 is depressed and closes the ports 20 as shown in figure 9. Hydraulic fluid cannot exit the cylinder space 11 so the contact plate 6 stays in the raised position, thus transferring a physical shock to a passing vehicle.

Figures 6 and 7 show an alternative method of operation to that of the speed obstacle described in figures 5, 8 and 9. Here the contact plate 22 is normally held flush with the road surface. In all other essential respects the rest of the speed obstacle is the same as in figure 5. The operation is the same as described for figure 5 except that the hollow cylinder 17 is

normally held in the closed position as indicated in figure 9. The speed obstacle becomes effective when the hollow cylinder 17 is raised by the operation of the actuators 18 as shown in figure 8. This allows hydraulic fluid to pass from the cylinder space 11 into the main reservoir 12. The road wheels of a passing vehicle will then be able to depress the contact plate 22, and a physical shock imparted to the vehicle when the road wheels make contact with the main body 10.

Figure 10 shows how speed obstacles can be linked to a common control valve. The valve 23 is situated at the side of the road and linked to a number of speed obstacles 24 by a pipe 25 into the cylinder spaces 26 at points 27. The operation of the speed obstacles is the same as that described in figures 6 and 7 in that the contact plates can only be depressed when valve 27 is in the open position, allowing hydraulic fluid to pass from cylinder spaces 26 into the reservoir 28. Adjacent obstacles not in contact with the wheels of the passing vehicle are kept in position by projections 15. This arrangement of a externally positioned valve system also applies to speed obstacles with protruding contact plates except that the speed obstacle is effective when the valve 27 is closed.

Figure 11 shows how electrically operated speed obstacles can used in conjunction with traffic lights. Here the speed obstacles 29 are positioned side by side across the roadway 30 adjacent to the traffic lights 31. The speed obstacles 29 are activated from the control box 32 via an electric cable 33 at the same time as the red stop light of the traffic lights 31 are turned on, and deactivated when the traffic lights 31 show green. Any vehicle going through red lights would receive a physical shock.

Figure 12 shows speed obstacles working in conjunction with a speed measuring device. The speed obstacles 34 are positioned side by side across the roadway 35. A speed measurement device 36, in this case a magnetic induction system laid below the road surface, is positioned before the the speed obstacles 34 and connected to a control box 37 via an electric cable 38. In use the speed of approaching vehicles is measured by the device 36 and passed to the control box 37. If the speed of the vehicle is outside the permitted range the control box 37 activates the speed obstacles 34 via an electric cable 39 imparting a physical shock to the offending vehicle as it passes over the speed obstacles.

Whilst the devices shown in the drawings illustrate how a barrier placed across a carraigeway can be used to control traffic, it is appreciated that

the speed obstacles described can be joined to a common contact plate so that the complete barrier need only require two

pistons and cylinder placed either end of a common contact plate.

the movement of the contact plate can be controlled by other means, such as mechanical, electrical, magnetic, pneumatic, or a combination of these.

a common valve system can be used with self actuated speed obstacles but more than one common valve system is required in a complete barrier and arranged in such away that no two linked speed obstacles make contact with a passing vehicle at the same time.

remotely controlled speed obstacles can be used in conjunction with any measuring devices that differentiate between vehicles, for example height, weight, length, colour, registration number.

there are numerous ways to incorporate the piston, cylinder, and valve system.

Claims

1. A speed obstacle for use on roads, said speed obstacle comprising

a contact plate (as herein described) connected to a controlling mechanism.

a body that allows said contact plate to move within.

2. A speed obstacle according to Claim 1 wherein said contact plate protrudes uppermost from said body and can be depressed into said body so that the uppermost surface of said contact plate is level to the uppermost surfaces of said body.

3. A speed obstacle according to Claim 1 wherein the uppermost surface of said contact plate is level with uppermost surfaces of said body and can be depressed into said body so that the uppermost surfaces of said contact plate is below the uppermost surface of said body.

4. A speed obstacle according to any one of Claims 1 to 3 wherein a cylinder, a piston and a valve are positioned in such a way that fluid movement, through port in said cylinder caused by action of said piston, can be controlled by said valve.

5. A speed obstacle according to any one of Claims 1 to 4 wherein said body has sufficient space around said cylinder to hold said fluid passing from said cylinder.

6. A speed obstacle according to any one of Claims 1 to 5 wherein a first coiled spring is positioned in such a way as to apply a separating force between said contact plate and said body if a downwards force is applied to uppermost surface of said contact plate.

7. A speed obstacle according to any one of Claims 1 to 6 wherein a flexible membrane is positioned between said contact plate and said body in such a way that said cylinder is totally enclosed within said body and said flexible membrane.

8. A speed obstacle according to any one of Claims 1 to 7 wherein projections on said contact plate are positioned in such a way as to limit the upward movement of said contact plate.

9. A speed obstacle according to any one of Claims 1 to 2 and 4 to 8 wherein a second coiled spring is positioned in such a way as to apply a second force to said valve if said valve moves.

10. A speed obstacle according to any one of Claims 1 to 2 and 4 to 9 wherein a hole in said valve is of such size that the flow of said fluid is sufficiently restricted through said hole as to induce a drag on said valve.

11. A speed obstacle according to any one of Claims 1 to 2 and 4 to 10 wherein said valve closes said port to the passage of said fluid if the quantity of said fluid passing through said hole induces sufficient drag upon said valve to overcome said second force.

12. A speed obstacle according to any one of Claims 1 to 8 wherein said valve is connected to an actuator in such a way that the operation of said actuator causes said valve to open or close said port to passage of said fluid.

13. A speed obstacle according to any one of Claims 1 to 12 wherein said piston, said cylinder and said valve are positioned within said body.

14. A speed obstacle according to any one of Claims 1 to 12 wherein said piston and said cylinder are positioned within said body with said valve positioned without said body and said valve being connected to said port by a pipe.

15. A speed obstacle according to any one of Claims 1 to 12 and 14 wherein said pipe connects said valve to more than one said port.

16. A speed obstacle according to any one of Claims 1 to 15 wherein said contact plate is connected to more than one said body.

17. A speed obstacle according to any one of Claims 1 to 3 wherein a number of said speed obstacles are positioned adjacent to each other across the carraigeway of a road.

18. A speed obstacle according to any one of Claims 1 to 3 wherein the movement of said contact plate is controlled by an hydraulic, mechanical, pneumatic, magnetic, or electrical device, or combination thereof.

19. A speed obstacle according to Claim 12 wherein the said actuator is activated hydraulically, pueumatically or electrically.

20. A speed obstacle according to Claim 12 wherein the said actuator is activated by a device that measures the speed of road vehicles.

21. A speed obstacle according to Claim 12 wherein the said actuator is activated by a device that differentiates between road vehicles.

22. A speed obstacle according to Claims 20 and 21 wherein the action of said device can be modified by an electronic or radio signal.

23. A speed obstacle according to any one of Claims 1 to 22 and substantially as herein described with reference to the accompanying drawings.

24. A method of selectively inhibiting the passage of road vehicles using a speed obstacle according to any one of the Claims 1 to 23 wherein said speed obstacle is placed in a road surface so that said contact plate is uppermost

at same level as said road surface, either imparting a physical shock to a passing road vehicle by allowing the weight of said vehicle to force said contact plate into said body so that the road wheel of said vehicle drops to below level of uppermost surface of said body so that said road wheel makes violent contact with inside walls of said body with said contact plate being returned to its original position by the action of said first coiled spring after said road wheel passes, or allowing said road vehicle to pass unhindered by the said contact plate staying in a position level with said road surface.

protruding above said road surface, either imparting a physical shock to a passing road vehicle by remaining in said protruding position so that the road wheel of said vehicle makes violent contact with said contact plate, or permitting the said vehicle to pass relatively unhindered by weight of said vehicle forcing said contact plate into said body so that uppermost surface of said contact plate is level to said road surface with the said contact plate being returned to its original position by the action of said first coiled spring after said road wheel passes.

25. A method according to Claim 24 and substantially as herein described.

Amendments to the claims have been filed as follows

1. A speed obstacle for use on roads, said speed obstacle comprising

a contact plate (as herein described) connected to a controlling mechanism that selectively arrests the downwards motion of said contact plate whereby said motion is caused by the weight of a road vehicle when said road vehicle makes contact with said contact plate as said road vehicle passes over said speed obstacle.

a body that allows said contact plate to move within.

2. A speed obstacle according to Claim 1 wherein said contact plate normally protrudes uppermost from said body and can be depressed into said body so that the uppermost surface of said contact plate is level to the uppermost surface of said body.

3. A speed obstacle according to Claim 1 wherein the uppermost surface of said contact plate is normally level with uppermost surface of said body and can be depressed into said body so that the uppermost surface of said contact plate is below the uppermost surface of said body.

4. A speed obstacle according to any one of Claims 1 to 3 wherein a cylinder, a piston and a valve are positioned in such a way that said valve can control fluid movement through port in said cylinder whereby such fluid movement is caused by action of said piston.

5. A speed obstacle according to any one of Claims 1 to 4 wherein said body has sufficient space around said cylinder to hold said fluid passing from said cylinder.

6. A speed obstacle according to any one of Claims 1 to 5 wherein a first coiled spring is positioned in such a way as to apply a separating force between said contact plate and said body if a downwards force is applied to uppermost surface of said contact plate.

7. A speed obstacle according to any one of Claims 1 to 6 wherein a flexible membrane is positioned between said contact plate and said body in such a way that said cylinder is totally enclosed within said body and said flexible membrane.

8. A speed obstacle according to any one of Claims 1 to 7 wherein projections on said contact plate are positioned in such a way as to limit the upward movement of said contact plate.

Patents Act 1977
aminer's report to the Comptroller under Section 17 (The Search Report)

Application number
GB 9304130.9

Relevant Technical fields

(i) UK Cl (Edition L) E1G

(ii) Int Cl (Edition 5) E01F

Search Examiner
D HAWORTH

Databases (see over)

(i) UK Patent Office

(ii)

Date of Search
10 JUNE 1993

Documents considered relevant following a search in respect of claims 1-25

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
X	GB 2233372 A (LA GAMBINA)	1 AT LEAST
X	GB 2079356 A (WILSON)	1 AT LEAST
X	WO 88/07606 A (OLYMPIC MACHINES INC)	1-3 AT LEAST
X	US 3849936 A (GERACI)	1,2 AND 6 AT LEAST
X	APT HYDRAKERB - Published by APT Controls Ltd 77-81 Scrubbs Lane, LONDON NW10 6SH	1,2,4 AND 5 AT LEAST

Category	Identity of document and relevant passages	Relevant to claim(s)

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E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.

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